



Florida Power & Light Company, 6501 South Ocean Drive, Jensen Beach, FL 34957

May 11, 2001

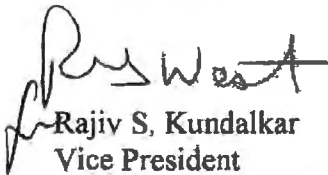
L-2001-119
10 CFR § 50.73

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Re: St. Lucie Unit 2
Docket No. 50-389
Reportable Event: 2001-001-00
Date of Event: March 14, 2001
Reactor Scram Due to CEA Drops

The attached Licensee Event Report 2001-001 is being submitted pursuant to the requirements of 10 CFR § 50.73 to provide notification of the subject event.

Very truly yours,



Rajiv S. Kundalkar
Vice President
St. Lucie Nuclear Plant

RSK/EJW/KWF

Attachment

cc: Regional Administrator, USNRC, Region II
Senior Resident Inspector, USNRC, St. Lucie Nuclear Plant



LICENSEE EVENT REPORT (LER)

(See reverse for required number of
digits/characters for each block)

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

FACILITY NAME (1)

St. Lucie Unit 2

DOCKET NUMBER (2)

05000389

PAGE (3)

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TITLE (4)

Reactor Scram Due to CEA Drops

| EVENT DATE (5) | | | LER NUMBER (6) | | | REPORT DATE (7) | | | OTHER FACILITIES INVOLVED (8) | |
|--|-----|------|--------------------|-------------------|-----------------|--------------------|-----|------|-------------------------------|---|
| MONTH | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | MONTH | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| 03 | 14 | 2001 | 2001 | - 001 | - 00 | 05 | 11 | 2001 | FACILITY NAME | DOCKET NUMBER |
| THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more) (11) | | | | | | | | | | |
| OPERATING MODE (9) | | 1 | 20.2201(b) | | | 20.2203(a)(3)(ii) | | | 50.73(a)(2)(ii)(B) | 50.73(a)(2)(ix)(A) |
| POWER LEVEL (10) | | 100 | 20.2201(d) | | | 20.2203(a)(4) | | | 50.73(a)(2)(iii) | 50.73(a)(2)(x) |
| | | | 20.2203(a)(1) | | | 50.36(c)(1)(i)(A) | | X | 50.73(a)(2)(iv)(A) | 73.71(a)(4) |
| | | | 20.2203(a)(2)(i) | | | 50.36(c)(1)(ii)(A) | | | 50.73(a)(2)(v)(A) | 73.71(a)(5) |
| | | | 20.2203(a)(2)(ii) | | | 50.36(c)(2) | | | 50.73(a)(2)(v)(B) | OTHER |
| | | | 20.2203(a)(2)(iii) | | | 50.46(a)(3)(ii) | | | 50.73(a)(2)(v)(C) | Specify in Abstract below or in NRC Form 366A |
| | | | 20.2203(a)(2)(iv) | | | 50.73(a)(2)(i)(A) | | | 50.73(a)(2)(v)(D) | |
| | | | 20.2203(a)(2)(v) | | | 50.73(a)(2)(i)(B) | | | 50.73(a)(2)(vii) | |
| | | | 20.2203(a)(2)(vi) | | | 50.73(a)(2)(i)(C) | | | 50.73(a)(2)(viii)(A) | |
| | | | 20.2203(a)(3)(i) | | | 50.73(a)(2)(ii)(A) | | | 50.73(a)(2)(viii)(B) | |

LICENSEE CONTACT FOR THIS LER (12)

NAME

Kenneth W. Frehafer, Licensing Engineer

TELEPHONE NUMBER (Include Area Code)

(561) 467 - 7748

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

| CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO EPIX |
|-------|--------|-----------|--------------|--------------------|-------|--------|-----------|--------------|--------------------|
| B | JD | 90 | G080 | YES | - | - | - | - | - |

SUPPLEMENTAL REPORT EXPECTED (14)

| | | | | | | |
|---|---|----|-------------------------------|-------|-----|------|
| YES (If yes, complete EXPECTED SUBMISSION DATE). | X | NO | EXPECTED SUBMISSION DATE (15) | MONTH | DAY | YEAR |
|---|---|----|-------------------------------|-------|-----|------|

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On March 14, 2001, St. Lucie Unit 2 was in Mode 1 operation at 100 percent reactor power. At 1752 hours, the reactor automatically tripped when both control element assembly motor generator sets output breakers opened. With the exception of a few minor equipment issues, the trip was uncomplicated. Control room operators performed standard post trip actions.

Long term thermal degradation caused the failure of the 2B control element assembly motor generator set voltage regulator, and subsequently lead to the opening of both motor generator sets output breakers.

The 2A and 2B motor generator sets voltage regulators were replaced, and the unit was on-line on March 18, 2001.

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

Description of the Event

On March 14, 2001, St. Lucie Unit 2 was in Mode 1 operation at 100 percent reactor power. At 1750 hours, the control room operators received annunciator K-15 "2A CEA Drive MG Set Local Alarm." Control Room indications were that the output breaker of the 2A control element assembly (CEA) motor generator (MG) set [EIIS:JD:MG] had opened and an operator was dispatched to investigate. Twenty seconds later, the control room operators received annunciators K-23 "CEDMCS Trouble" and K-36 "Continuous Gripper Voltage High." The control room desk reactor control operator was sent to investigate these new annunciations. Prior to receiving any new information from troubleshooting efforts, the Unit 2 reactor automatically tripped at 1752 hours. Control room operators noted that the output breaker of the 2B CEA MG set opened at the time of the reactor trip. Control room operators began standard post trip actions.

The trip was uncomplicated except for the following minor equipment deviations:

- Following the reactor trip, the 2A startup transformer 6.9KV breaker 2-30101, "Incoming 6.9KV from Unit Auxiliary Transformer 2A" opened as required, but breaker 2-30102 [EIIS:EA:XFMR:52], "Incoming 6.9KV from Startup Standby Transformer 2A" did not close. The resultant loss of power caused the 2A1/2B2 reactor coolant pump (RCP) motors and 2A main feedwater (MFW) pump motor to stop.
- The secondary feedwater system experienced a water hammer in the feedwater piping.
- Following the reactor trip, condenser backpressure started to increase. The nuclear watch engineer (NWE) placed the 2A and 2B condenser hogging ejectors in service to help maintain condenser backpressure so that the steam bypass control system remained in service. By 2220 hours, the condenser backpressure was being maintained by the steam jet air exhaust system and the hogging ejectors were removed from service.

All equipment problems were dispositioned, and reactor operation resumed on March 18, 2001.

Cause of the EventReactor/Turbine Trip

This event was caused by the malfunction of the 2B CEA MG set voltage regulator. This resulted in a reactor by turbine trip that was initiated when this failure caused the opening of both CEA MG sets output breakers.

The investigation of the 2B CEA MG set revealed that long term heat related degradation led to a failed circuit board trace in the 2B CEA MG voltage regulator circuit. This caused components downstream of the break location to lose their reference to the circuit common. In turn, this caused excessive firing of the voltage regulator silicon controlled rectifier (SCR), resulting in the over excitation of the 2B generator field. The fuse for the voltage regulator circuitry blew due to the increased current associated with the over excitation.

The failed 2B CEA MG voltage regulator indirectly caused the ammeter relay (AMR) breaker trip of the 2A CEA MG set output breaker. The AMR low trip setpoint was reached as the 2A CEA MG set voltage regulator attempted to maintain output voltage (which was being driven high by the faulty 2B CEA MG voltage regulator) by reducing its own field current. Additionally, the most likely cause for the CEDMCS trouble and

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continuous gripper voltage alarms was the overvoltage condition caused by the 2B CEA MG set voltage regulator malfunction. Finally, after the 2A CEA MG set output breaker opened, the 2B CEA MG set output breaker tripped open on an overvoltage condition caused by the over excitation of the generator field.

Both Unit 2 CEA MG sets voltage regulators were replaced under work order (WO) 31006941. The replacement boards, as now supplied by the vendor, have a modified power resistor location that mounts power resistors away from the circuit board. Therefore, the new boards are less susceptible to printed circuit board failure due to power resistor heating.

2A Startup Transformer 6.9KV breaker

The 2A startup transformer breaker failure was caused by an incorrectly installed spring on the tripping latch roller pin. With the spring incorrectly installed, the pivot latch pin was allowed to misalign and block the operation of the trip trigger units and prevent the close trigger from proper operation. FPL inspected four other breakers susceptible to this condition prior to the restart of Unit 2, and no other spring installation problems were noted. The faulty breaker was repaired under WO 31006943. Subsequently, the remaining 13 breakers susceptible to the spring installation issue were inspected and no problems were found. St. Lucie procedures 0-EMP-46.01, "Periodic Maintenance of 6900 Volt Switchgear Breakers," and 0-EMP-52.05, "Periodic Maintenance of 4160 Volt Switchgear Breakers," were revised to ensure that the tripping latch roller pin spring locations are correct.

Feedwater System Waterhammer

Following the reactor trip the 2A MFW pump stopped due to the loss of the 6.9KV electric bus. This condition resulted in a pressure drop in the 'A' feedwater train causing water hammer of feedwater piping. The feedwater system was walked down and no damage was found.

Condenser Vacuum

The cause for the degrading condenser backpressure was found to be malfunctioning gland steam pressure-regulating valves (PCV-08-842 and PCV-08-879). The regulating valves were repaired under WOs 31006966 and 31007071.

Analysis of the Event

This event is reportable under 10 CFR 50.73(a)(2)(iv) as any event or condition that caused manual or automatic actuation of the reactor protection system, including reactor scram or trip.

Analysis of Safety Significance

Reactor trips are analyzed events and pose no significant safety issues. The trip was uncomplicated and minor equipment issues were dispositioned. The St. Lucie Unit 1 CEA MG set voltage regulators are a different model than the Unit 2 voltage regulators, and do not exhibit the same type resistor heating concerns as do the Unit 2 models. As a conservative measure, both Unit 1 CEA MG sets voltage regulators were refurbished by General Electric during the April 2001 St. Lucie Unit 1 refueling outage (SLU-17). FPL periodically inspects the voltage regulators as part of a preventive maintenance program for both St. Lucie units.

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The effects of the feedwater system water hammer were evaluated. A walkdown of the 'A' feedwater train piping/support components was conducted from the steam trestle to the 'A' feedwater pump. This walkdown also included piping/supports in the low power feedwater control system and the common header for both the 5A and 5B high pressure feedwater heaters. In addition, an inspection of the general condensate piping/supports on the mezzanine level of the turbine generator building and the condensate recirculation piping/supports to the 2A condenser was performed. No structural or component problems or damage was caused as a result of the water hammer.

Therefore, this event had no adverse impact on the health and safety of the public.

Corrective Actions

1. The 2A and 2B CEA MG sets voltage regulators were replaced under WO 31006941. Additionally, the MG set parameters were monitored for one week to insure proper operation of both MG sets and their load sharing capability.
2. The 1A and 1B CEA MG sets voltage regulators were refurbished and re-installed during the SLI-17 refueling outage under work orders (WO) 31007354 and 31007355.
3. The 2A startup transformer 6.9KV breaker 30102, "Incoming 6.9KV from Startup Standby Transformer 2A," was repaired under WO 31006943.
4. Procedures O-EMP-46.01, "Periodic Maintenance of 6900 Volt Switchgear Breakers" and O-EMP-52.05, "Periodic Maintenance of 4160 Volt Switchgear Breakers," were revised to ensure that the tripping latch roller pin spring locations are correct.
5. The feedwater system was walked down to determine if the water hammer caused any damage and no damage was found.
6. The gland steam pressure-regulating valves (PCV-08-842 and PCV-08-879) were repaired under WOs 31006966 and 31007071.

Additional InformationFailed Components Identified

Manufacturer General Electric
Component Voltage Regulator
Model Number 3300A03B0073

Similar Events

None